

## Warm Up # 5-4

$$X \sim N(32, 16)$$

Sketch the curve and calculate:

1.  $P(X < 38)$

2.  $P(25 < X < 33)$

3. Draw and find  $k$

if  $P(X > k) = 0.691$

**EXERCISE 11E.1**

1 Construct an expected frequency table for the following contingency tables:

**a**

	Likes chicken	Dislikes chicken	sum
Likes fish	$A = 45$	15	60
Dislikes fish	30	10	40
sum	75	25	100

total pop.

$$A = \underbrace{\left( \begin{matrix} \text{Prob.} \\ \text{Likes} \\ \text{Fish} \end{matrix} \right)}_{\text{Prob. of liking both}} \left( \begin{matrix} \text{Prob.} \\ \text{Likes} \\ \text{Ch.} \end{matrix} \right) \left( \begin{matrix} \text{Total} \\ \text{pop} \end{matrix} \right)$$

$$A = \frac{60}{100} \cdot \frac{75}{100} \cdot 100 = 45$$

**b**

	<i>Drove to work</i>	<i>Cycled to work</i>	<i>Public transport</i>	<i>sum</i>
<i>Male</i>				44
<i>Female</i>				36
<i>sum</i>	46	14	20	80

C

	<i>Junior school</i>	<i>Middle school</i>	<i>High school</i>	<i>sum</i>
<i>Plays sport</i>	35	59	71	165
<i>Does not play sport</i>	23	27	35	85
<i>sum</i>	58	86	106	250

d

	Wore hat and sunscreen	Wore hat or sunscreen	Wore neither	sum
Sunburnt	3	5	13	
Not sunburnt	36	17	1	
sum				

### Calculating $X^2$ by hand:

$$\chi^2_{calc} = \sum \frac{(f_o - f_e)^2}{f_e} \quad \text{where } f_o \text{ is an observed frequency} \\ \text{and } f_e \text{ is an expected frequency.}$$

$f_o$  original data from contingency table

$f_e$  from your calculated expected values if the variables are assumed Independent

$f_o$	$f_e$	$f_o - f_e$	$(f_o - f_e)^2$	$\frac{(f_o - f_e)^2}{f_e}$
			<i>Total</i>	

## Contingency Table:

	Graduated	Failed to Graduate	Total
Experimental	73	12	85
Control	43	39	82
Total	116	51	167

## Expected Value:

	Graduated	Failed to Graduate	Total
Experimental	59.04	25.96	85
Control	56.96	25.04	82
Total	116	51	167

$f_o$	$f_e$	$f_o - f_e$	$(f_o - f_e)^2$	$\frac{(f_o - f_e)^2}{f_e}$
73	59.04	13.96	194.88	$\approx 3.30$
12	25.96	-13.96	"	$\approx 7.51$
43	56.96	-13.96	"	$\approx 3.42$
39	25.04	13.96	"	$\approx 7.78$
Total				$\approx 22.01$

$$\chi^2 = \sum \frac{(f_o - f_e)^2}{f_e}$$

## With calculator:

Enter  $f_o$  values into a matrix.

**2nd** MATRIX ► EDIT, **ENTER**

Enter # of Rows by # of Columns, then your table values without the sums.

Run the  $\chi^2$  test: **STAT** ► TESTS ▼  $\chi^2$  test

The calculator will automatically calculate the expected frequencies, store them in another matrix and run it all through the formula!

HW: 11E.1 p. 337, # 2c,  
#3ab part ii

Rev Set 10A p. 312, # 2, 6, 7

Rev Set 10B, # 1, 2